

96-456551/46 A28 E13 (A18 A60) SUMO 95.02.27  
 SUMITOMO CHEM CO LTD \*DE 19607203-A1  
 95.02.27 95JP-038219 (96.10.10) C08L 71/12, C07D 211/58, 401/14,  
 C08K 5/10, 5/15, 5/18, 5/3435

Thermoplastic resin compsn. used to produce materials for packaging, etc. - comprises blend of polyphenylene ether with non-crystalline thermoplastics and contains 4-amino-2,2,6,6-tetra:methyl piperidyl cpd. to improve heat stability during processing

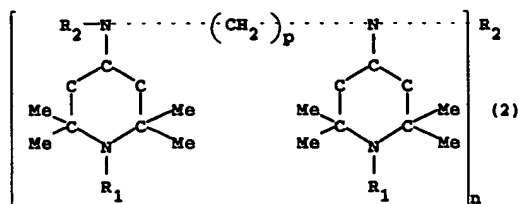
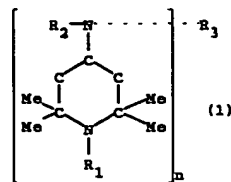
C96-143191

Addnl. Data: SANADA T, ANBO T  
 96.02.26 96DE-1007203

A thermoplastic resin (T) comprises:

- (A) 1-99 wt. % of polyphenylene ether; and  
 (B) 99-1 wt. % of one or more non-crystalline thermoplastic chosen from alkenyl aromatic resins, non-crystalline aromatic polyesters, methacrylates, polyetherimides or aromatic polysulphones.  
 (T) contains 0.001-15 pts. wt. of at least one 4-amino-2,2,6,6-tetra methyl piperidyl cpd. (C) of formula (1) or (2), per 100 pts. (A) and (B).

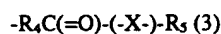
A(5-H7A, 7-A3C, 7-A4E, 8-A4) E (5-H7A, 7-D13B)



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R<sub>1</sub> = H, O, OH, (cyclo)alkyl, allyl, benzyl, aryl, alkanoyl, alkenoyl or (cyclo)alkyloxy;

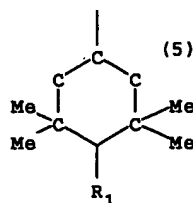
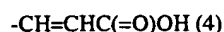
R<sub>2</sub> = H, alkyl or gp. of formula (3);



R<sub>3</sub> = n-valent organic gp.;

R<sub>4</sub> = single bond, alkylene, alkylidene or arylene;

R<sub>5</sub> = H, alkyl, aryl or gp. of formula (4) or (5);



X = single bond, O or NH;

n = 1 - 4; and  
 p = 2 - 6.

#### USE

(T) can be injection-, extrusion-, blow-, plate- or film-moulded materials for packaging, household electrical appliances, exterior vehicle parts or interior decoration components.

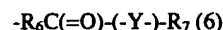
#### ADVANTAGE

Thermal degradation of (A), e.g. discolouring or cross-linking, is reduced during processing.

#### PREFERRED COMPOSITION

For (1) and (2):

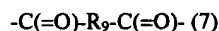
n = 1 and R<sub>3</sub> = H, (cyclo)alkyl, alkenyl, benzyl, aryl or gp. of formula (6);



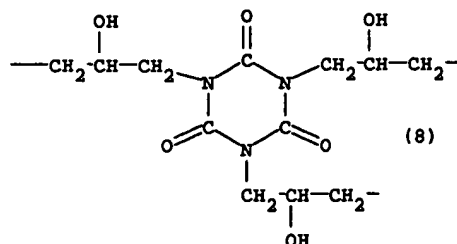
n = 2 and R<sub>3</sub> is alkyl or gp. of formula (7);

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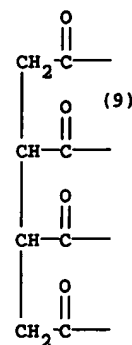
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n = 3 and R<sub>3</sub> is a gp. of formula (8);



or n = 4 and R<sub>3</sub> is a gp. of formula (9) or (10);



Y = single bond, O or NR<sub>8</sub>;

R<sub>6</sub> = single bond, alkylene, alkylidene or arylene;

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$R_7$  and  $R_8 = \text{H, OH, alkyl or aryl}$ ; and  
 $R_9 = \text{single bond, alkylene, alkylidene or arylene}$ .

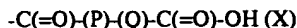
Pref. (I) or (2) are cpds. (I) or (II), in which  $R_1$  and  $R_2$  are H or 1-18C alkyl and  $n = 1$  or 2:

for cpd. (I)  $n = 1$ ,  $R_3$  is H, (cyclo)alkyl, alkenyl or gp. of formula (6), Y is a single bond, O or  $\text{NR}_8$ ,  $R_6$  is a single bond, 1-10C alkylene, alkylidene or arylene and  $R_7$  and  $R_8$  are H, 1-18C alkyl, 6-21C aryl or gp. of formula (5) or (6), and

for (II)  $n = 2$ ,  $R_3$  is a gp. of formula (7) and  $R_9$  is a single bond, 1-10C alkylene, alkylidene or arylene.

(I) is pref., in which  $R_1 = \text{H or methyl}$ ,  $R_2$  is H and  $R_3$  is alkylene (pref. hexamethylene), or  $R_2$  is alkyl and  $R_3$  is alkylene, or  $R_2$  is a gp. of formula (3) and  $R_3$  is alkylene.

For cpds. (1), pref.  $n = 1, 2$  or 4,  $R_2$  is H, O, OH, 1-8C alkyl, cycloalkyl, allyl, alkanoyl, alkenoyl or (cyclo)alkoxy and: when  $n = 1$ ,  $R_2$  is H, 1-8C alkyl or gp. of formula (X) and  $R_3$  is H, (cyclo)alkyl, alkenyl, benzyl, allyl or gp. of formula (6);



P, Q = alkylene, alkylidene or vinyl(idene);

when  $n = 2$ ,  $R_2$  is H, 1-8C alkyl or gp. of formula (X) and  $R_3$  is

alkylene or gp. of formula (7); and when  $n = 4$ ,  $R_2$  is H or 1-8C alkyl and  $R_3$  is a gp. of formula (9) or (10).

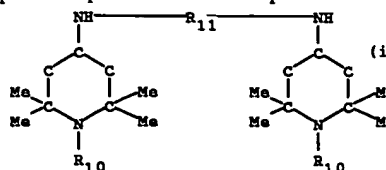
Pref.  $R_1$  and  $R_2$  are H or 1-8C alkyl and  $n = 1$  or 2:

if  $n = 1$  then  $R_3$  is H, (cyclo)alkyl, alkenyl or gp. of formula (6),  $R_6$  is a single bond, 1-10C alkylene, alkylidene or arylene and  $R_7$  and  $R_8$  are OH, 1-18C alkyl, 6-21C aryl or a gp. of formula (4) or (5), and

if  $n = 2$ ,  $R_3$  is a gp. of formula (7) and  $R_9$  is a single bond, 1-10C alkylene, alkylidene or arylene.

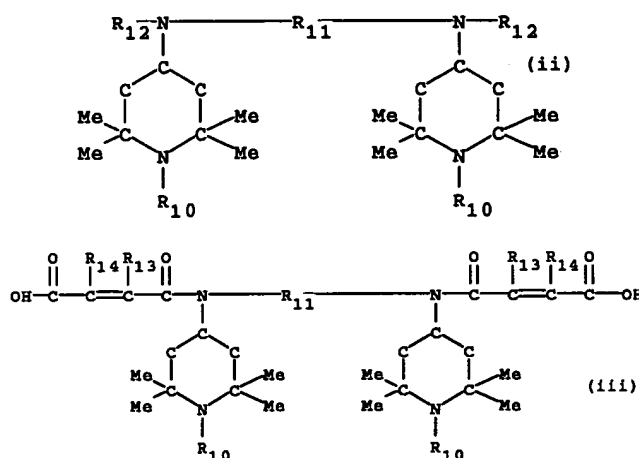
Most pref.  $n = 2$ ,  $R_1$  is H or methyl,  $R_2$  is H and  $R_3$  is alkylene (pref. hexamethylene), or  $R_2$  is alkyl and  $R_3$  is alkylene.

(1) most pref. comprises at least one cpd. of formula (i) - (iv):



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$R_{10} = \text{H, OH, alkyl or alkoxy}$ ;

$R_{11} = \text{alkylene}$ ;

$R_{12} = \text{alkyl}$ ;

$R_{13}, R_{14} = \text{H or methyl}$ .

In (i)  $R_{10}$  is pref. OH, 1-10C alkyl or 1-10C alkoxy and esp. H or methyl, and  $R_{11}$  is pref. 2-8C alkylene, esp. hexamethylene.

In (ii) - (iv)  $R_{10}$  is pref. OH, 1-10C alkyl or 1-10C alkoxy and esp. H or methyl  $R_{11}$  is pref. 2-8C alkylene and  $R_{12}$  is 1-18C alkyl.

Alternatively in cpds. (1),  $R_1$  is H, O, OH, 1-8C alkyl, cycloalkyl,

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allyl, benzyl, aryl, alkanoyl, alkenoyl or (cyclo)alkoxy,  $R_2$  is H or alkyl and (I)  $n = 1$ , (II)  $n = 2$  or (IV)  $n = 4$ .

In (I)  $R_3$  is H, (cyclo)alkyl, alkenyl, benzyl, allyl or gp. of formula (6) and  $R_7$  and  $R_8$  are OH, alkyl, aryl or a gp. of formula (4) or (5);

in (II)  $R_3$  is a gp. of formula (7); and

in (IV)  $R_3$  is a gp. of formula (9) or (10).

Pref.  $R_1$  is H or 1-8C alkyl,  $R_2$  is H or 1-18C alkyl and  $n = 1$  or 2 - in (I)  $R_3$  is H, (cyclo)alkyl, alkylene or a gp. of formula (6),  $R_6$  is a single bond, 1-10C alkylene, 1-10C alkylidene or arylene, and  $R_7$  and  $R_8$  are H, 1-18C alkyl, 6-21C aryl or a gp. of formula (4) or (5) and for (II)  $R_9$  is a single bond, 1-10C alkylene, 1-10C alkylidene or arylene.

For cpds. (2),  $R_1$  is H, O, OH, 1-8C alkyl, cycloalkyl, allyl, benzyl, aryl, alkanoyl, alkenoyl or (cyclo)alkoxy,  $R_2$  is H or 1-8C alkyl,  $R_3$  is a gp. of formula (8),  $n = 3$  and  $p = 2 - 8$ .

(B) is an alkenyl aromatic resin.

#### EXAMPLE

N,N'-bis(2,2,6,6-tetra methyl-4-piperidyl)-1,6 -hexane diamine (cpd. (1)) was prepd. by hydrogenating a mixt. of 981 g. (6.32 mols.) 2,2,6,6-tetramethyl-4-piperidine, 350 g. (3.01 mols.) hexamethylene

diamine, 1500 g. methanol and 5 g. Pt/C (5%) for 4-5 hr. at 70 - 80 °C with  $\text{H}_2$  at 45 bar. The catalyst was filtered off at 70 - 80 °C and 2 - 3 bar and then the prod. was distilled to give 1070 g. cpd. (1) (90% yield).

A blend of 60 wt.% polyphenylene ether (PPE) (2,6-dimethyl phenol homopolymer; mol. wt. = 61000) and 40 wt.% Sumibright UH3000 (RTM: polystyrene), to which 1 wt.% of cpd. (1) was added, was extruded at 260 °C from a twin-screw extruder. The strand was chopped up and cooled in water to form a granulate that was dried under vacuum for 2 hr. at 130 °C. The granulate was moulded in a cylindrical former (290 °C) at 1200 kg./cm<sup>2</sup> and 80 °C mould temp. to give a 3.2 mm. thick test sample.

The izod impact strike resistance at 23 °C was 10.1 (7.2), reducing to 5.5 (2.1) and 5.7 (2.3) after heating at 150 °C for 100 and 500 hr. respectively - figs. in brackets are for the same resin blend without the cpd. (1). (JS) (39pp2382DwgNo.0/0)

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